

MINDING THE GAP

INVESTING IN A SKILLED MANUFACTURING WORKFORCE



Jobs for the Future

Advanced manufacturing is growing and thriving in the United States. Companies are in great need of reliable employees who can communicate well, effectively make decisions, and are interested in long-term careers with opportunity for advancement. Employers have identified a need for a more robust talent pipeline to narrow America's skills gap—a mismatch between the job-market needs in business and industry and the education and preparedness levels of the workforce. To address this important issue, Jobs for the Future, the National Fund for Workforce Solutions, and the Manufacturing Institute convened higher education and business leaders with state labor officials and other experts for a summit called Minding the Gap: Investing in a Skilled Manufacturing Workforce.

The gaps are clear. The manufacturing sector desperately needs more workers with solid reading and math skills, who are responsible and ready to work, and who can work as machinists, welders, and industrial maintenance technicians, says Scott Ellsworth, the executive director of Business Leaders United. "We've got a crisis on our hands," he said. If America can address the problem, "we have an economic development opportunity that's colossal."

Johan Uvin, acting assistant secretary for Career, Technical, and Adult Education at the U.S. Department of Education, explains that the nation is seeing steady job creation, and the advanced manufacturing, information technology, and automotive sectors are thriving and growing. High school graduation and college enrollment rates are at all-time highs. However, the skills gap is befuddling government and industry. With high job vacancy rates even during periods of

high unemployment, there is debate about mobility in types of jobs and between economic classes, and a mismatch between higher education and the job market. Uvin calls for a “paradigm shift” in examining and addressing these issues, not just from a labor standpoint but also from education and other sectors.

The summit was held amid rising interest in advanced manufacturing. President Barack Obama has cited the sector in his 2013, 2014, and 2015 State of the Union addresses, calling for expansions of the National Network for Manufacturing Innovation—regional hubs across the nation designed to create public-partnerships to advance technology and create new products. In addition, the President’s Council of Advisors on Science and Technology renewed its [Advanced Manufacturing Partnership Steering Committee](#), which made important recommendations to the President in 2012 that are currently being implemented. Most recently, the U.S. Department of Labor awarded \$175 million in [American Apprenticeship Grants](#), the largest investment the federal government has ever made in apprenticeships, and advanced manufacturing is one of the few high-growth sectors of focus.

Increasing collaborations among business and industry, workforce agencies, community colleges, local and state governments, and the nonprofit sector are developing solutions—but not quickly or often enough, or at the scale needed to address demand. The summit sought to address that by focusing on *key factors facing advanced manufacturers and the colleges and workforce training agencies that work with them:*

- **Solutions can start at any place in the education-to-workforce pipeline—with young people in high school, community college students, or unemployed or incumbent workers.** These work-based education and training models can be effective in recruitment or onboarding of new employees, development of skills aligned with employers’ needs, and career advancement opportunity, because employers themselves are deeply engaged in the design and implementation of these programs.
- **There is a need for innovations in and scaling of work-based learning strategies** such as on-the-job training, apprenticeships, internships, and other “earn and learn” models. Work-based learning treats the learner first as an employee rather than a

student, while harnessing the potential for instruction and skill development inherent in a job itself. Assignments use actual work tasks and responsibilities to teach both applied and academic skills.

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providing more meaningful and rewarding career opportunities for workers. Sessions at the conference highlighted some innovations and practices that work already—which hold promise for further development and scaling of solutions.

THE NEED FOR A STRONG MANUFACTURING TALENT PIPELINE: CHALLENGES

Jobs for the Future Senior Vice President Maria Flynn outlined the robust workforce demand in manufacturing as the industry has rebounded and the talent barriers to sustaining that growth recede. This set the stage for two days of discussions around possible solutions. Manufacturing is seeing a resurgence in the United States and needs a more robust talent pipeline to flourish. Many [U.S. manufacturers](#) are considering “re-shoring” jobs from overseas because of the country’s skilled workforce relative to other manufacturing hubs, yet many companies also lack succession planning to maintain that expertise. These trends have happened as unemployment rates remained high, and many advanced manufacturing companies cannot fill their job vacancies.

Aging Workforce

Retirements are a major issue in manufacturing. A defense contractor faces 40 percent retirement in its workforce over the next seven years, says Ellsworth of Business Leaders United. In most cases, companies

have little time or money to direct toward training. Moving products out the door is all they can do.

Growing Demand for Higher Skills

Advances in technology mean that more manufacturing jobs require workers to have some level of postsecondary education. Two out of three companies list talent as their top barrier to growth, according to the Manufacturing Institute.

Barriers to Partnerships

The need is great for stronger partnerships across business, education, and workforce agencies. These partnerships have been able to spread the most promising efforts to address the gap between what education and training provides and what businesses need, and so offer an option for meeting those needs on a greater scale.

To build these relationships, stakeholders must understand the challenges that their partners face. Challenges surfaced at the summit reflected the constraints of the organizations in these partnerships—particularly small businesses and community colleges—and the delivery strategies themselves.

Small businesses often have little strategic capacity to recruit new employees or to develop training programs on their own.

Another challenge is that manufacturing may sound like a dated industry to younger workers. In reality, many positions can pay well, offer advancement, and use cutting-edge technologies to make products in high demand in sectors like aerospace and automotive engineering. High schools and community colleges can help students and their families understand the promise of career and technical education programs in manufacturing and technology that can lead to well-paying jobs. However, families who have experienced layoffs in the manufacturing industry are often hesitant to give it another try.

Meanwhile, **community colleges** are sometimes locked into traditional education models that include credit hours and longstanding degree or certificate programs that do not always meet local businesses' needs. Planning and approval for new courses or programs can take months or even years.

Other challenges that often face community colleges in developing new programs to meet local businesses' needs include:

- Finding good career and technical education instructors who have work experience but need to advance their teaching skills. Some schools were finding success in tapping apprenticeship supervisors as instructors.
- Rewarding career experience with college credit and strengthening opportunities to earn credit for skills already mastered.
- Aligning community college programs and student needs. Colleges need to adjust schedules for working adults, perhaps compressing a full load of classes into only one or two days a week.

Some community colleges are making progress in addressing workforce needs and students' preparation for in-demand careers, but cumbersome rules around the creation of new courses and accreditation rules.

FILLING THE PIPELINE: DEMAND-DRIVEN CAREER PATHWAYS

To best match workers to opportunities in the industry, individuals must be able to access career pathways through multiple points of entry. In an ideal system, these points of entry exist in secondary, postsecondary, and the workforce:

1. High school students are exposed to employers through work-based learning and career and technical education.
2. Partnerships with community colleges are valuable both to companies who have access to graduates with the knowledge and skills they need, and to the community colleges who can better ensure student success.
3. Un- or underemployed workers can return to college or occupational training, bettering themselves and becoming another talent resource for employers.

The summit explored colleges' and companies' work with these populations of potential employees.

Starting in High School

Advanced manufacturing is a promising employment path for some of today's high school students, but many don't know about it. Through the [Pathways](#)

to Prosperity Network, JFF is helping high schools prepare students for these high-tech jobs that pay well and allow for advancement by integrating career education and work-based learning opportunities into their curriculum. Some high schools and career-technical programs offer advanced technology curricula, but they are not often aligned with local labor market needs. Advanced manufacturing work is not gritty and dangerous, but students need better information about opportunities in the field. Employers can work more closely with educators to build the curriculum, provide equipment, and publicize the advantages of these careers.

At the same time, work-based learning scares some schools and businesses away, says Diane Rossa, the manager of workforce and talent development for MAGNET, a Cleveland-based workforce development intermediary. Her fee-for-service agency focuses on emerging, transitioning, and incumbent workforce issues.

Companies should offer varied work-based learning experiences with on-the-job mentors who enjoy working with students, treat them with respect, and want to show them how their jobs work.

work but continuing their education" at the same time. She recommends that companies offer varied work-based learning experiences with on-the-job mentors who enjoy working with students, treat them with respect, and want to show them how their jobs work.

Albany Scholarship Program Trains Young Adults

In the absence of established, replicable models to follow, some businesses have created scholarship and internship programs on their own. David William Davis, the president and chief operating officer of Simmons Machine Tool in Albany, New York, says that his staff realized they had fewer and fewer younger workers. His company works on small railroads and streetcars in New York, Washington DC, New Orleans, and other locations. In 2007, the average age of workers in his machine shop was over 55. They approached nearby Hudson Valley Community College for help in building

Their major emphasis is on work-based learning as a solution to the trickling talent pipeline and "moving young people in high school into real

a more stable talent pipeline. "We realized we need to get out and start doing outreach to guidance counselors, parents, and students."

The result was a scholarship program that employs young adults 10 to 15 hours a week and pays for community college classes based on grades. A local General Electric plant and others now do the same, he says. Students are guaranteed a job when they finish their certification.

In creating the program, Davis realized that many young people were disinterested in manufacturing. Some parents are wary of manufacturing because of how many jobs the sector has shipped overseas from the local area. Additionally, some parents see industrial jobs as outdated, when in reality they often involve the latest technology.

Half of the students not only have completed Associate's degrees, but have continued on to complete graduate degrees in engineering, benefiting his plant and many others in the region. Davis says the state labor agency has been resistant to formal apprenticeships, so his company has made them less formal, although pending state legislation could change that. A key skill he has found students learn through work-based learning at his company: how to deal with failure, talk about missteps, learn from them, and improve upon their work and processes.

Community Colleges Building Business Talent

Community colleges are a key training partner for businesses in many areas across the country. These colleges serve recent high school graduates, but also incumbent workers for continued training, and underprepared adults who have come back to school. Transforming this varied set of students into a robust talent pipeline requires a complex set of solutions. Often, community colleges have to bring up the basic skills of their students while simultaneously preparing them to succeed on the job. Jobs for the Future's Accelerating Opportunity is successfully bringing lower-skilled adults to the advanced manufacturing talent pipeline by redesigning how Adult Basic Education is delivered. Manufacturing is one of the most popular pathways for Accelerating Opportunity college students, who enter and complete basic skills education while obtaining industry-recognized credentials. By aligning and accelerating ABE, GED, and

Jobs for the Future helps community colleges and job training providers utilize real-time [labor market information](#) (LMI) to align their programs with the needs of regional economies. LMI vendors collect online job postings, and de-duplicate and analyze them in order to reveal up-to-the-minute regional job trends. This information can enable users to:

- Redesign curriculum to align with the skills needed by local employers
- Advise students on best bet careers and the pathways needed to get there
- Align strategic investments with projected high-growth occupations

developmental programs and providing nontraditional students with additional support, Accelerating Opportunity career pathway programs enable more low-income and other underserved adults to complete postsecondary credentials and develop soft skills that are of value in advanced manufacturing careers.

Manufacturing Pathway in Massachusetts

For more advanced students or for incumbent workers looking for a new career direction, national industry certifications are attractive, as they often hold weight with employers. Some colleges and companies are taking additional steps to customize or create new credentials that meet their specific needs. Lee Duerden, professor of manufacturing technology at Quinsigamond Community College in Massachusetts, joined Leslie Parady, project manager for MassMEP, a state manufacturing extension partnership, to discuss how they helped create an applied manufacturing technology pathway certification program.

Duerden's background is as a mechanical engineer in the United Kingdom, where he completed a traditional apprenticeship. He found it difficult to build such a model into an Associate's degree program at an American community college, but saw the need.

The college partnered with industry to create the program, overcoming resistance of college concerns about traditional credit hours. The partners broke down specific types of skills and expected outcomes and molded them into courses, including many hours of on-the-job training toward the degree. The program began as a way to address the needs of one company but is spreading to others, says Duerden.

Making the Business Case for Career Advancement for Adults

Training for potential employees works best when it serves the needs of businesses. That means companies must be directly involved in shaping the types of training available in their local areas. Measuring and demonstrating the business impact of training efforts can show the value of such programs. The Manufacturing Institute has helped employers understand this value by creating a Return on Investment Calculator that it shared with summit attendees.

Because businesses are under considerable pressure to maintain low costs, they are often reluctant to invest in training. To overcome this, education and training partners must be able to measure the business impact of frontline workforce training and be able to articulate this impact in a manner satisfactory to business leadership.

Mike Munday, CEO of Arwood Manufacturing Company, explains the difficulty manufacturing companies face in setting aside time to teach employees in order to keep up their skills. But, he also says that it is important for manufacturers to get past that mindset and train workers no matter what. His company is heavily involved in apprenticeship programs in his region of Massachusetts, working with schools, veterans, workforce boards, and on-the-job training grants to create these opportunities. Arwood has also developed an in-house training function incorporating online classes from Tooling U and on-the-job-training with support from the Commonwealth Corporation. Munday detailed how their in-house metrics on cost of quality—such as productivity and waste—have demonstrated that this approach is paying off for Arwood.

An on-the-job training model, when well designed and implemented, carries potentially significant benefits to employers and employees, as well as to the cultivation of a highly skilled labor force for the future.

based on company needs. Leslie Parady pointed out that companies struggle to articulate their needs to colleges or workforce agencies. Nearly 3 out of 4 manufacturers in Massachusetts have fewer than 20 employees, she said, giving them little capacity or time to assess their needs. This is where organizations like hers come in. MassMEP's certification program is designed for the paper and metal fabrication sectors and fills the region's needs better than comparable national certifications, she says.

Parady explains what this means on the ground through MassMEP's partnership with Siemens Corporation in Worcester, Massachusetts. Together, they quantified Siemens' skills gap by benchmark testing against a standardized set of industry-developed competencies. Utilizing MassMEP's certification program, Siemens is combining strategic workforce planning tools and structured pathway training with business metrics to better align program design with its business goals. By identifying specific skills needs, Siemens has assessed the financial and non-financial impact of their workforce development activities and justified the costs of training.

National industry certifications also serve individuals and businesses well, as they are transparent and portable credentials. The Manufacturing Institute has worked with an array of industry associations to promote specific, nationally recognized certificates in fields such as production technology, manufacturing technology, welding, machining and metalworking,

Partners can help businesses understand the benefits of education and training to their bottom line and customize programs

automation, construction, fabrication, quality control, die casting, and many others. Nearly 300,000 such certifications have been awarded since 2011.

INNOVATIONS IN WORK-BASED LEARNING, PARTICULARLY APPRENTICESHIP

Another key to career advancement for some adults is work-based learning, which allows employees to further their education and skills while remaining on the job. The conference explored work-based learning and other strategies that can provide a high return on investment and help to build a better workforce.

Work-based learning strategies—spanning apprenticeship, on-the-job training, and internships—have many benefits including customization to employer needs, “earn while you learn” for workers, and structured connections between theory and hands-on learning. When done right, they can draw on the strengths of businesses and colleges or community-based trainers, but they can be complicated and face challenges in implementation. Still, such programs are the focus of much attention in both industry and education.

Barriers to Apprenticeships

Why are some companies and schools hesitant to create apprenticeship programs? There are several reasons, according to Brent Weil, the senior vice president for education and workforce at the Manufacturing Institute:

- 1. Many companies have different priorities**, despite workforce gaps. Companies that have world-class supply chains for raw materials and highly sophisticated production processes often do not have the same expertise in developing their supply of human talent.

The [National Fund for Workforce Solutions](#) is a growing national partnership of employers, communities, workers, and philanthropy investing in more than 30 regional funder collaboratives. The National Fund strengthens local economies by implementing demand-driven workforce strategies that create talent supply chains, close skill gaps, and improve systems. 170 workforce collaboratives across 28 states have engaged some 4,700 employers since 2007. Participants have earned a total of over 37,000 degrees and credentials. The collaboratives are sector-based (e.g., advanced manufacturing, health care) and yield better outcomes for unemployed participants than comparison programs in employment rates and earnings one year after completion.

2. The perceived costs and bureaucracy scare many of them off. Small companies cannot afford registered apprenticeships or see greater opportunity in internship programs and structured on-the-job training outside of the registered apprenticeship process. We may consider how to advise companies on state guidelines for registered apprenticeships and when they are appropriate over individual programs.

3. Myths about the realities of advanced manufacturing impact the numbers of youth and other entrants into training.

There are also concerns about how to update apprenticeship and internship models and make them more widely accepted. Tax incentives and signing bonuses for employees who join a company after training were discussed as options.

These factors prevail despite clear evidence that failing to have the best workers contributes to increases in overtime and downtime, Weil said.

Innovations and New Initiatives in Work-Based Learning and Apprenticeships

Innovations in work-based learning and on-the-job training are leading to new ways of worker training that pay off both for employers and employees. JFF is piloting a variety of work-based learning strategies. With support from the National Science Foundation, JFF is working with Owensboro Community and Technical College in Kentucky to adapt existing manufacturing courses to a delivery model that maximizes work-based learning. WGBH, New England's arm of PBS, will help create a multimedia toolkit to help community colleges offer work-based learning courses around the country.

The [Boeing Manufacturing On-the-Job Training Project](#), funded by The Boeing Company and the National Fund for Workforce Solutions, has shown that on-the-job training can help employers identify promising employees, allow employers to customize their own training, and advance workers without overburdening the company. Under most on-the-job training programs, employers receive a partial subsidy for a predetermined amount of time that covers each employee's training period. Employers typically bear all of the training costs but receive a subsidy of 50 to 90 percent for the wages of participants during the training period. An on-the-job training model, when well designed and implemented, carries potentially

significant benefits to employers and employees, as well as to the cultivation of a highly skilled future labor force.

For these and other programs, a theme of the summit was the importance of articulating, measuring, and communicating the business impact of frontline workforce training. It is in the best interests of both the supply and demand side for educators and workforce development agencies to target their programs to match the current business needs of manufacturers. The impact of such programs can be demonstrated in terms of higher productivity, reduced turnover and recruitment

costs, and other measures.

There is also a need to refine methodologies for measuring the financial

impact to more strongly make the case for companies to increase investments in training—and to provide stronger evidence for making the case for such programs to their peers, leading to sector-wide strategies.

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The summit highlighted these and other innovations from around the country in developing local coalitions of business and education, new kinds of apprenticeships, and other strategies that are boosting the quality of workers' skills and raising education levels and career trajectory.

Manufacturing Program at an Illinois College Grows to Meet Demand

Maria Coons, the vice president for workforce and strategic alliances at William Rainey Harper College, describes her college's work to address workforce needs in her region. Machine tool companies in Illinois began expressing concerns about a workforce shortage five or six years ago, Coons says. Meanwhile, her college had shut down their manufacturing program due to lack of interest.

In response to companies' pleas for better-prepared job candidates, Harper College convened a task force to help develop a new manufacturing curriculum. The college involved the Illinois Manufacturers Association, local high schools, and manufacturers with fewer than 150 employees. This partnership led to early internships and apprenticeships. Students are paid

while they earn certification as production technicians. They choose an area of emphasis within the program, including metal fabrication, precision manufacturing, and supply chain and logistics. Students can complete an Associate's degree and return to finish a Bachelor's degree through articulation agreements with four-year colleges.

The revamped program now enrolls about 450 students, rising from virtually none four years ago. Harper College is part of the Illinois Network for Advanced Manufacturing, with 21 community colleges under a federal grant. The consortium aims to address the skills gap in the region, estimating 30,000 job openings in manufacturing in the region over the next few years that pay an average of \$29 per hour.

Bringing Employers Together in Ohio

Partners for a Competitive Workforce has brought together public agencies and private companies to develop apprenticeship programs in two counties in Ohio that train for two in-demand occupations: welders and machine operators. The innovative pilot pulled together a cohort of apprentices from across small- and medium-sized manufacturers that could not support a full class on their own. The eight employers agreed to common training standards, a starting wage of \$12.00 per hour and a wage scale that increased to \$14.00 per hour during the training. Stephen Tucker emphasizes the lessons of building consensus and enthusiasm among multiple manufacturers, workforce development agencies, and educational institutions. Public and private partners each contributed to the training costs, so that all partners were invested in the success of the workers.

The one-year apprenticeships were designed based on the common needs of the participating employers, ensuring that the apprenticeships meet their specialized needs. At the same time, the participants receive college credit and credentials from National Career Readiness Certificate and National Institute for Metalworking Skills or the American Welding Society, for machine operators and welders, respectively. This provides workers with both educational advancement and credentials that are recognized throughout the industry. This customized design paired with national standards offers a robust way to meet the needs of the Cincinnati region's manufacturers, who are expected to have over 18,000 advanced manufacturing skilled job openings within the next 10 years.

North Carolina Employer Shows Students Modern Manufacturing

In North Carolina, Walter Siegenthaler's company has built an apprenticeship program that helps identify and keep workers for

"Management and unions had to sit down and work together and they realized they wanted the same things—better productivity and trustworthy employees."

—Jeff Smith, President, United Steel Workers Local 3740

their plant. Frustrated by not finding the workers they needed—even importing technicians from other countries at first—the Austria-based Max Daetwyler Corporation teamed with others about 14 years ago to form the Apprenticeship 2000 program. Recruiting began in 1995, and the first graduates finished in 2000. The industry must replace an aging workforce, handle growth in their business, and needs well-educated workers who can fill a variety of positions throughout a career. "We need talent," said Siegenthaler, the executive vice president of the company, adding they do not educate simply for niche jobs but for many kinds of roles employees might experience throughout a career.

Even after years of success, some students and parents remain fearful of such programs, harkening back to poor manufacturing conditions in textile mills that once dominated the region. "A lot of people don't know what an apprenticeship is," Siegenthaler says. "What we're doing isn't what they think." The company makes computer chips in a bright, clean environment that hardly resembles the dungeon-like plants some families recall when they think of manufacturing. Employees collaborate with guidance counselors in local schools and identify high school juniors who may be interested, providing them with plant tours and an open house for parents. "In Europe, students look for apprenticeships. We have to look for apprentices," he says.

Apprentices are selected at the start of their senior year and they spend a half-day at school and a half-day at work. After graduation, they work four days a week and attend community college one day a week. Their college study leads to an Associate's degree in mechatronics, and a full-time job offer. The program now has three locations in the state and may expand further, Siegenthaler says.

The program is expensive, "but is it a cost or is it an investment? We have a really well-trained employee from the first day they graduate," he explains.

Industry, Union Partnerships Can Make Apprenticeships Work

Jobs for the Future worked with the AFL-CIO in Wisconsin to develop an apprenticeship program that can be implemented elsewhere. This registered apprenticeship leads to certification as an industrial manufacturing technician. Rhandi Berth, vice president of the Wisconsin Regional Training Partnership, which worked on the program, says the certification is for assemblers or machine operators and is now replicable in most states.

"We're an industry- and union-led model to address a missing piece" in workforce needs, says Berth. While her state has had apprenticeships for a century, this certification is a baseline for manufacturing workers and can impact employees' level of pay and responsibility. The program is competency-based but equals 3,000 hours of training.

Creating the program was a long process involving the state workforce agency, the technical college system, and a state legislative body that must approve apprenticeships. Apprentices take classes at the community college in addition to their work hours, but they are paid for that time. Entry-level apprenticeship jobs start with relatively low wages and require no experience, but jobs are still hard to fill with quality employees who are responsible and want to stay and grow, says Lou Ann Koval, the vice president of human resources and general counsel of HB Performance Systems Inc., also known as Hayes Brake for motorcycles and similar vehicles.

Turnover was an issue, Koval says. "I had union-level jobs and no way to fill them." Senior management resisted the program at first, but soon saw its value in keeping good workers, she says. Jeff Smith, president of United Steel Workers Local 3740 and an employee at manufacturer PurePower Technologies, says that the workforce is aging and they need a way to sustain those skills in the face of retirements. The program allows workers to find a path toward advancement and higher wages. "It was something we had to do," he says. Management and unions had to sit down and work together, and they realized they wanted the same things—better productivity and trustworthy employees.

"The ultimate goal is what's best for the company," says Smith.

Brandi Dunham was an inspector at HB Performance Systems who finished her apprenticeship and then became a production technician and earned the certification. She told the conference audience about how she had been laid off as a bank teller. She began work as an assembler, where she showed promise. She started the apprenticeship program, which helped her learn additional math skills and led to advancement. "If it hadn't been for this apprenticeship, she may have left," says Geri Scott, director at Jobs for the Future.

- Watch a [video about industrial manufacturing technician apprenticeships](#).

IDEAS FROM AROUND THE GLOBE

Work-based learning has been a key strategy to addressing workforce shortages and gaps around the world. The summit brought together industry representatives and leaders from several countries to examine how partnerships are taking shape around the globe. Alexei Monserrat, representing the Manufacturing Institute and the Atlantic Council, led a discussion at the summit featuring these international leaders.

Internships and Opportunities for Women in the United Arab Emirates

Badr Al-Olama, the chief executive officer of Strata Manufacturing in the United Arab Emirates, described the UAE's interest in developing its high-tech manufacturing sector to avoid a continued economic overreliance on the oil industry. This includes aerospace, health care, satellites, and steel and aluminum manufacturing. His company makes composite materials used in making airplane tails and wings.

To address a talent shortage, the company now has its main manufacturing facility in India, says Al-Olama. His company has tailored four career paths with clear steps toward advancement through increasing responsibility and improved productivity. "We sell a career," he says. The company focuses on a long-term strategy rather than short-term competition. Machinists can move into innovation, he says, and technologists or specialists can become adept at producing parts or making repairs. "What better way to find engineers?"

In the UAE, the company also found many well-qualified female candidates who were college graduates but could not find jobs. Now, the company provides four months of foundational training for already-educated workers, 6 months at aircraft plants, and then 12 months of on-site training. More than 9 in 10 of the company's roughly 200 technicians are women, he says, which reflects a national vision for employing more women in advanced occupations.

Strata Manufacturing has invested in 10 UAE nationals, all women, who have become team leaders for multinational groups of workers that include men—which improves opportunities for Emirati women in the workplace. The company listens closely to its employees, Al-Olama says, including the many women who often juggle their career with being a mother and running a household. The government does provide support for education and covers all preschool and nursery fees, he says. The company uses social media and videos to market their available apprenticeship opportunities. Employees, rather than executives, speak to community groups so that job candidates can relate to people in the positions for which they will apply.

Partnerships in Ireland

In Lorcan O'hObain's country, local partnerships are addressing workforce needs. As a senior program manager for Skillsnet Ltd.—an Irish state agency that works with 59 local job training networks, 2,000 companies, and some 250,000 people—his main task is to help businesses find the workers they need. Each training network serves a specific geographic area or type of industry, such as food services, information technology, and packaging. "Our whole model is based on asking what businesses need," he says.

Each network applies for state funding for half of what they need to support local training efforts. They have created certification programs that take a person's time on the job and prior training into account. He calls the notion of spending two years to get a degree "nonsense," and says their programs stress mastery of skills instead of classroom "seat time." Asked whether working directly with competitors is a challenge, O'hObain said it is not an issue except when discussing corporate strategy, which rarely happens at a local training level. Plus, many local industries often depend on one another as suppliers rather than as competitors.

THE VIEW FROM STATE CAPITALS AND WASHINGTON

State and federal policy is a critical tool to scale up innovative programs from pockets of effective solutions to systemic change. Some states have been leading this change, and the federal government is focusing major attention on both the manufacturing sector and apprenticeships.

From Program to State Level

Some states are taking initiative to address workforce gaps by tapping into the formerly unemployed and by adding new career pathways for those adults plus new high school graduates.

The state of Kansas has launched a project to help more low-skill adults complete the GED and enter workforce training that leads to industry credentials. The program has already provided the state with about 100 new industry-certified workers in just 9 months, making a \$2.5 million contribution to the state's economy. The work is helping more adults working very low-wage jobs or who are unemployed to find their way into postsecondary education and higher-wage, more satisfying jobs.

The Manufacturing Institute has launched a public policy series and shared its findings from its recently released report on [State Responses to the Skills Gap](#). It explores key policy innovations have supported industry credentials, industry partnerships, credit articulation, dual enrollment, and comprehensive state strategies to address skills shortages.

Federal Interest

Members of the Obama Administration addressed the summit audience and shared details of their initiatives to support building a stronger manufacturing workforce.

Byron Zuidema, the deputy assistant secretary for employment and training administration for the U.S. Department of Labor, noted the President's interest in workforce issues. The

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— Lorcan O'hObain, Senior Program Manager, Skillsnet Ltd.

American middle class has eroded to some extent because of the decline in good manufacturing jobs, he says. The sector "has never been in a brighter spotlight."

In January 2014 President Obama ordered a review of all federal job training programs, which led to Vice President Joe Biden's Ready to Work report in February, says Johan Uvin, acting assistant secretary for Career, Technical, and Adult Education at the U.S. Department of Education (whose first job was as a machine operator). The President then signed into law the Workforce Innovation and Opportunity Act, which aims to help provide training for some 36 million low-skilled workers who cannot advance or change careers.

WIOA represents a "huge national investment." Zuidema notes that leaders in the United Kingdom and Germany were bewildered when U.S. Secretary of Labor Thomas E. Perez asked intently about those nations' apprenticeship programs—they thought such programs were a given in all developed nations.

New and Potential Federal Investments

- Uvin expressed optimism about bipartisan support for a **reauthorized Perkins Act** that could help career-technical high school programs better prepare students for careers. He acknowledged that policies are not always keeping up with the situation businesses and communities are facing. Employer partnerships with schools hold promise in expanding and preparing a bigger and better manufacturing workforce, he said.
- The White House has convened the **Advanced Manufacturing Partnership Steering Committee 2.0**, a renewed, cross-sector effort to secure U.S. leadership in emerging technologies to create high-quality manufacturing jobs and enhance America's global competitiveness. The committee, which represents industry, academia, and labor, is a working group of the President's Council of Advisors on Science and Technology. The new Steering Committee built upon the progress made by the inaugural AMP committee created by President Obama in 2011.

- The U.S. Department of Labor has awarded \$175 million in **American Apprenticeship Grants**, the largest investment the federal government has ever made in apprenticeships, and advanced manufacturing is one of the few high-growth sectors of focus. Jobs for the Future has received \$5.5 million to expand our partnership with the Working for America Institute of the AFL-CIO, Wisconsin Regional Training Partnership, and four other local intermediary organizations to establish and promote the Industrial Manufacturing Technician hybrid apprenticeship model (see page 9). The funds will also be used to create 1,450 industrial manufacturing technician apprenticeships across eight states: Wisconsin, Minnesota, Indiana, Kentucky, Ohio, Michigan, Pennsylvania, and Illinois.

MOVING FORWARD

Summit participants made new connections and generated ideas to take home to their communities. They also expressed interest time and time again in making their concerns known to federal and state leaders.

Michael Gritton, executive director of KentuckianaWorks, says the conference will "keep the learning community going" in exchanging replicable ideas for improving the workforce and narrowing the skills gap. The gap persists between what employers need and the graduates and skills training that community colleges offer but the programs featured at the summit are useful, says Brent Weil, of the Manufacturing Institute.

In summary, says Maria Flynn of JFF, career paths need to be aligned across populations and institutions. "No more disconnects," she says, in getting workers educated toward meaningful careers that are in demand. Comprehensive systems across state and local workforce agencies, industry, and higher education are paying off—and more is needed as advanced manufacturing looks to the future

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Jobs for the Future is a national nonprofit that works to ensure educational and economic opportunity for all. We develop innovative career pathways, educational resources, and public policies that increase college readiness and career success, and build a more highly skilled workforce. With over 30 years of experience, JFF is the national leader in bridging education and work to increase mobility and strengthen our economy.



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